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(54) **STRAP FOR DIVING FACE MASK**

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A61F 9/02 (2006.01)

(52) **U.S. Cl.** 2/452; 351/43

(58) **Field of Classification Search** 2/2.14,
2/423, 452; 351/43
See application file for complete search history.

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(57) **ABSTRACT**

A strap for diving face mask includes an upper branched sub-section and a lower branched sub-section forming together a loop section in a middle zone of the strap as viewed lengthwise. The upper branched sub-section has a circumferential length larger than a circumferential length of the lower branched sub-section and preferably right and left halves of the strap are sloped toward the side of the lower branched sub-section.

14 Claims, 7 Drawing Sheets

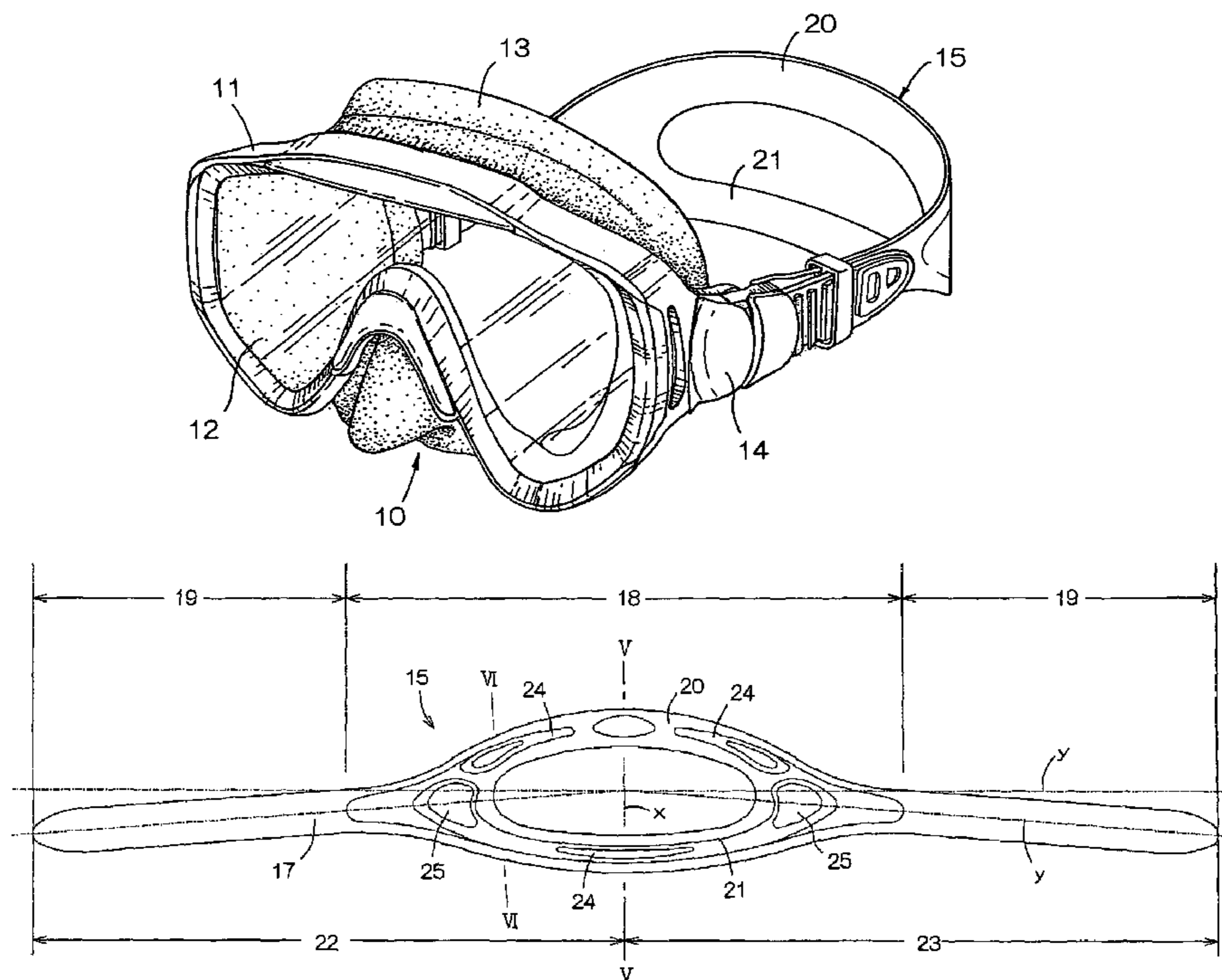


FIG. 1

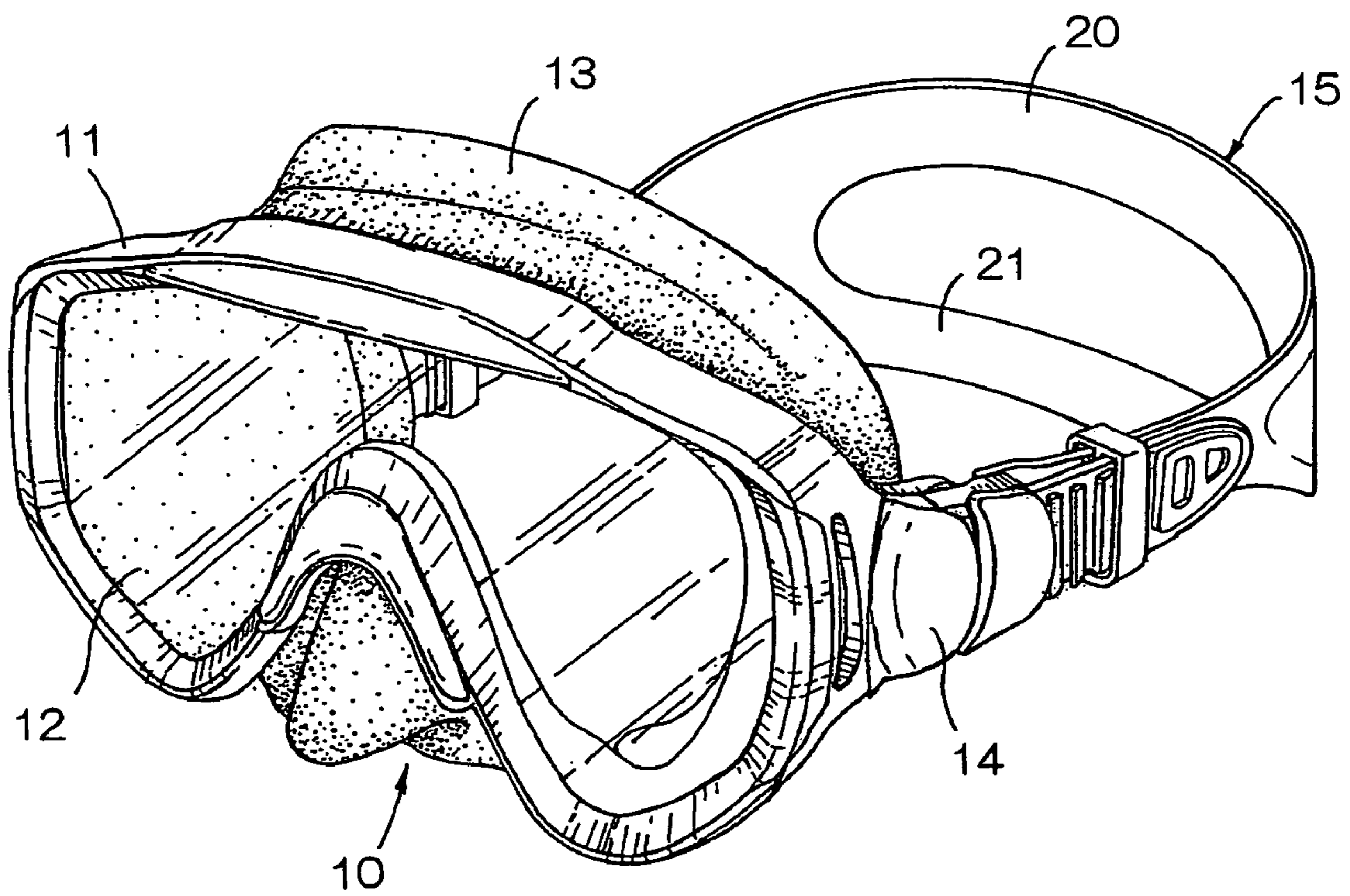


FIG. 2

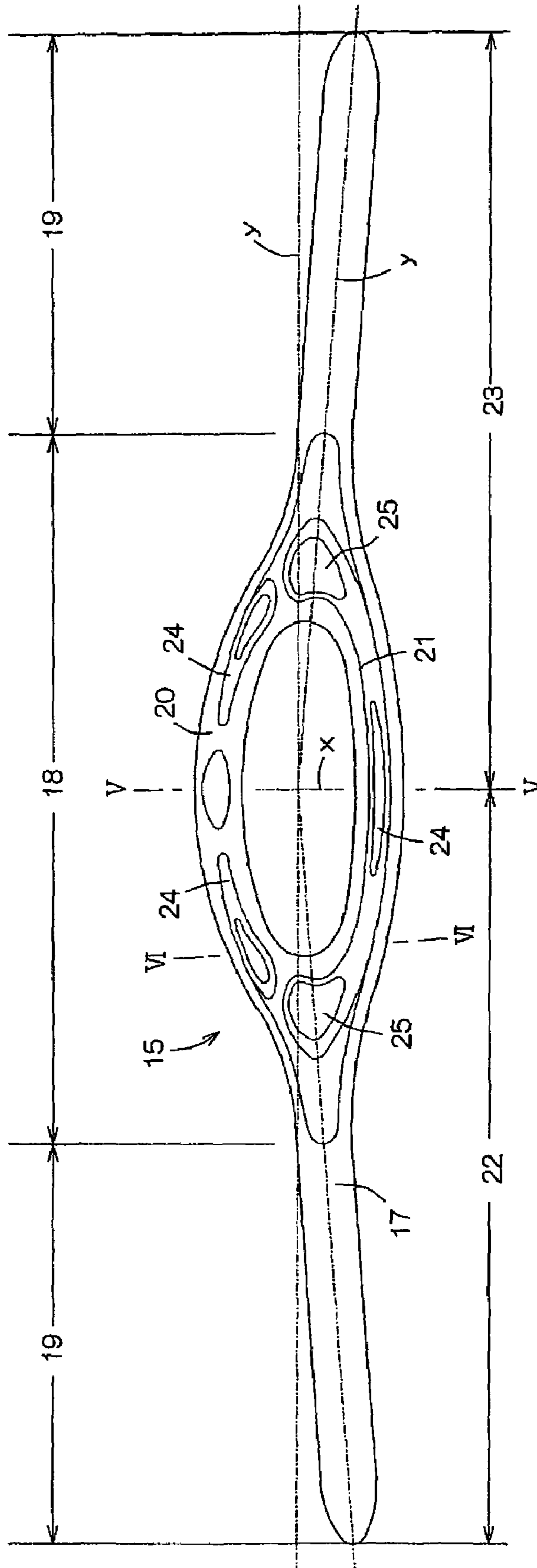


FIG. 3

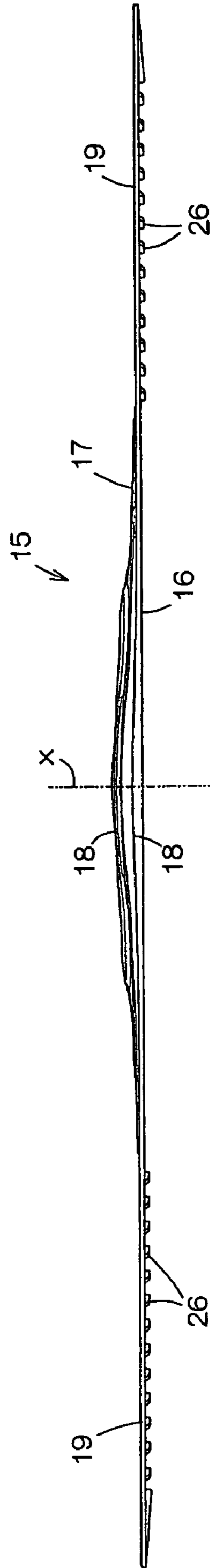


FIG. 4

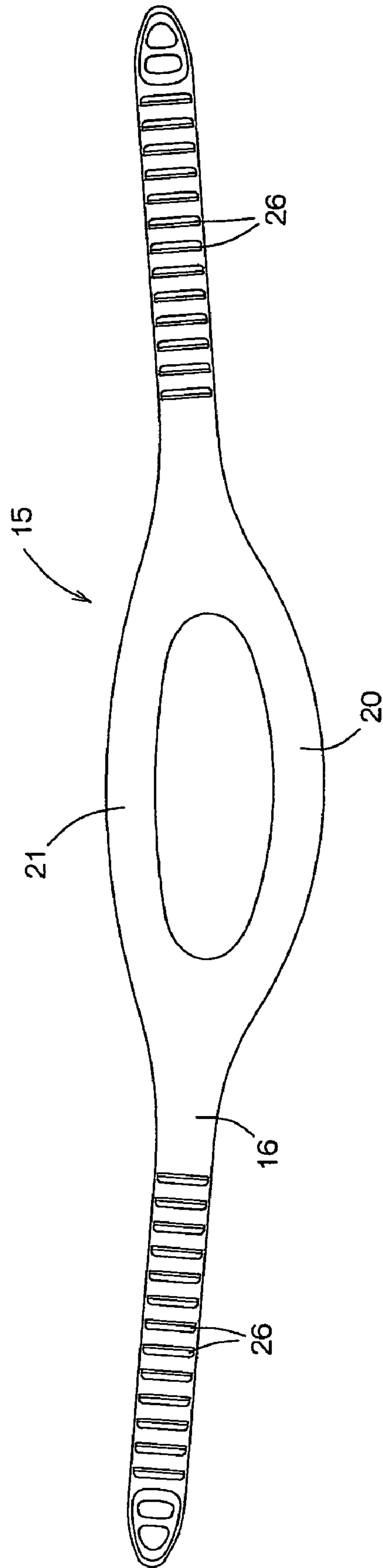


FIG.5

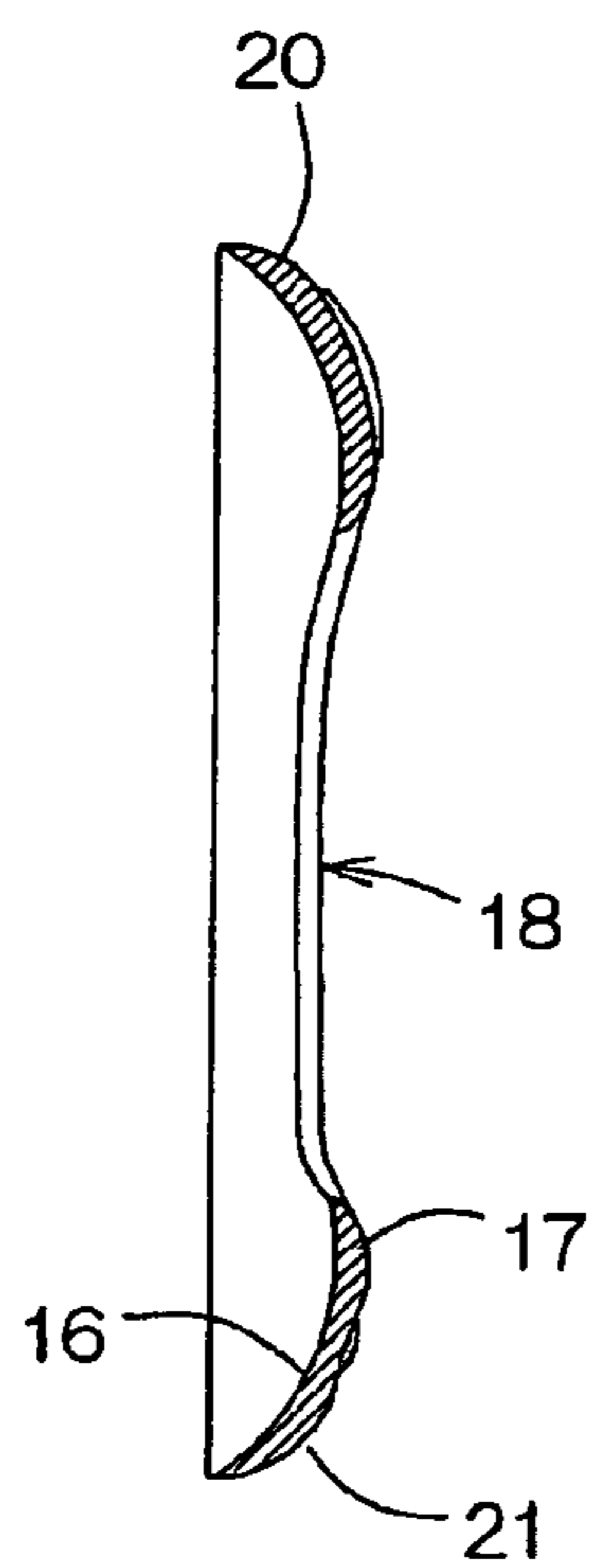


FIG.6

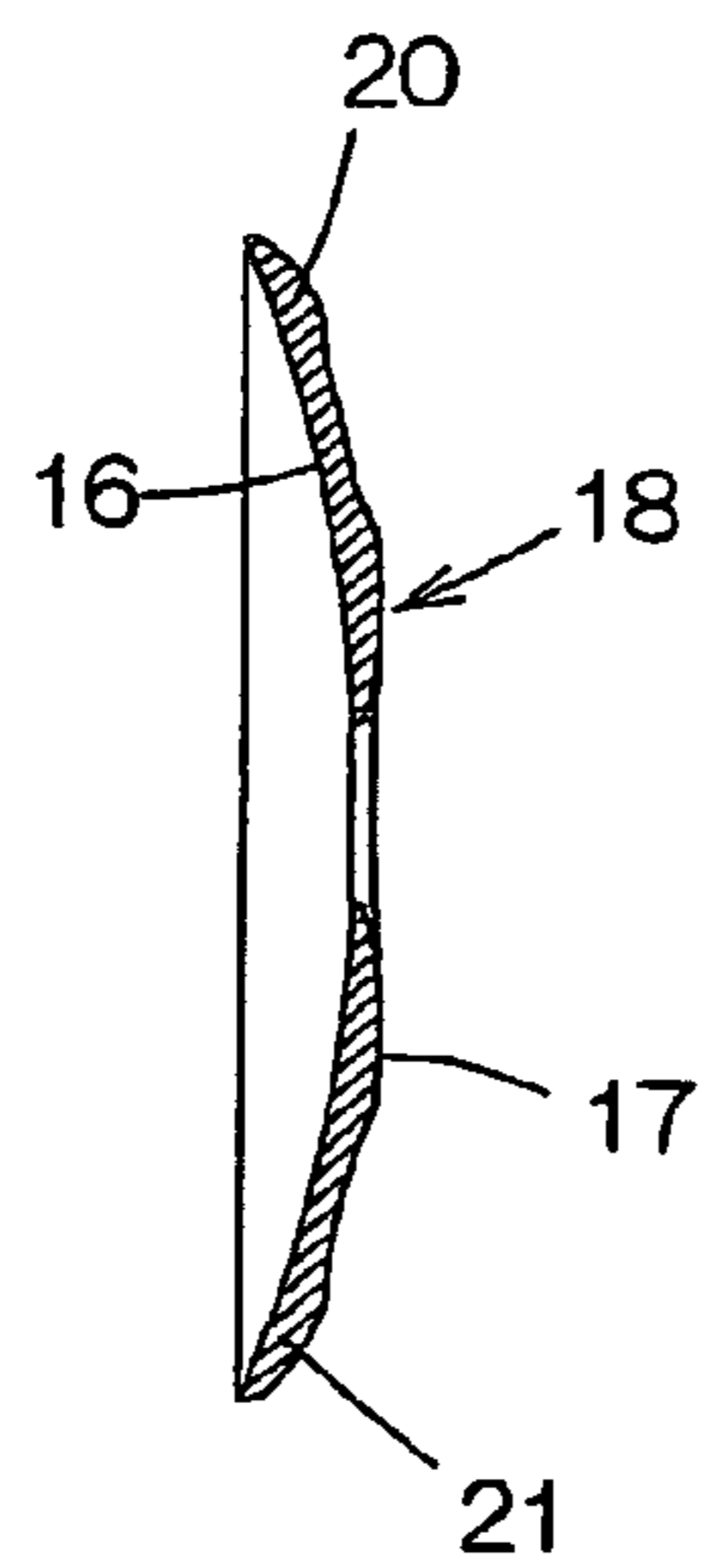


FIG. 7

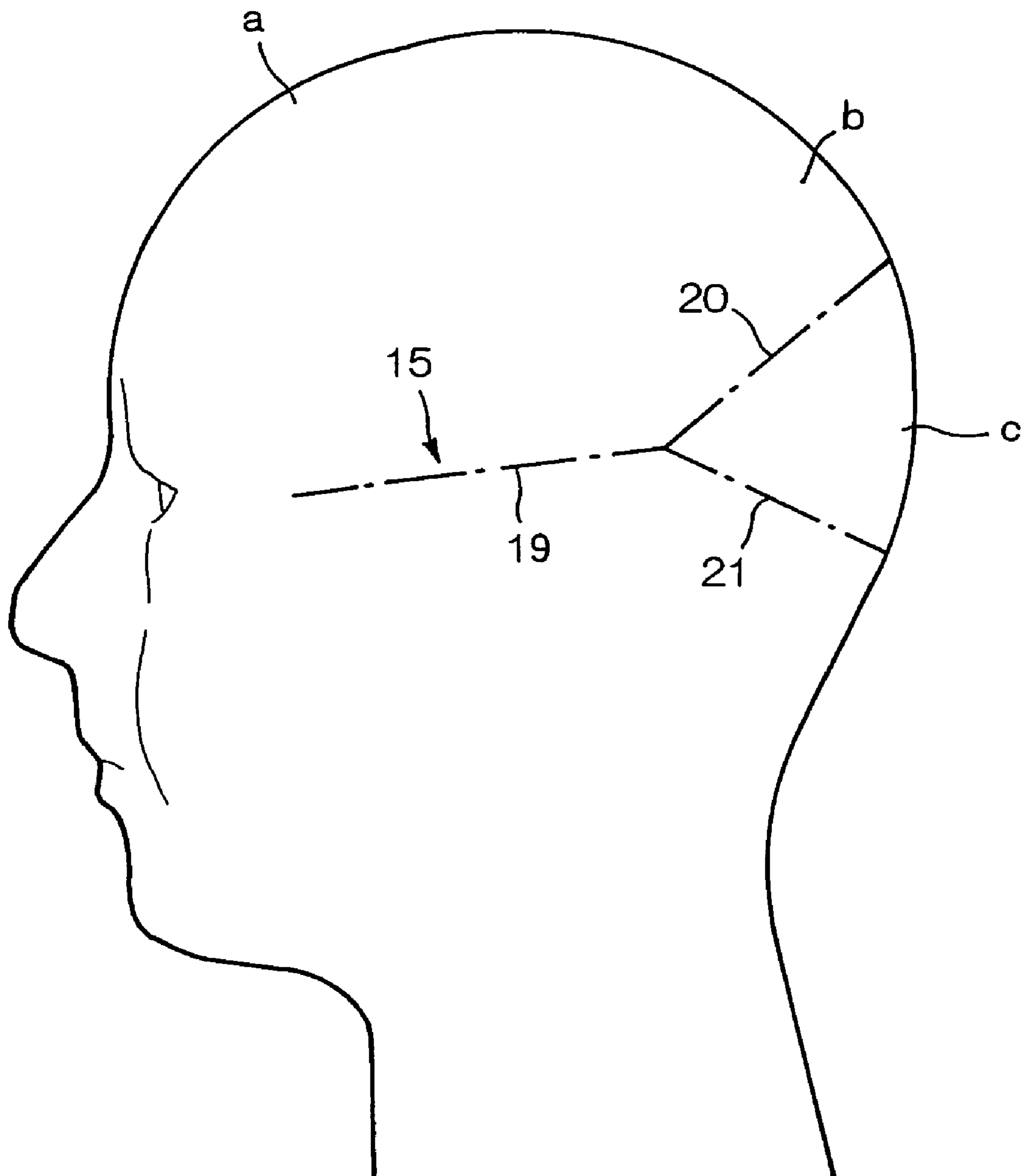
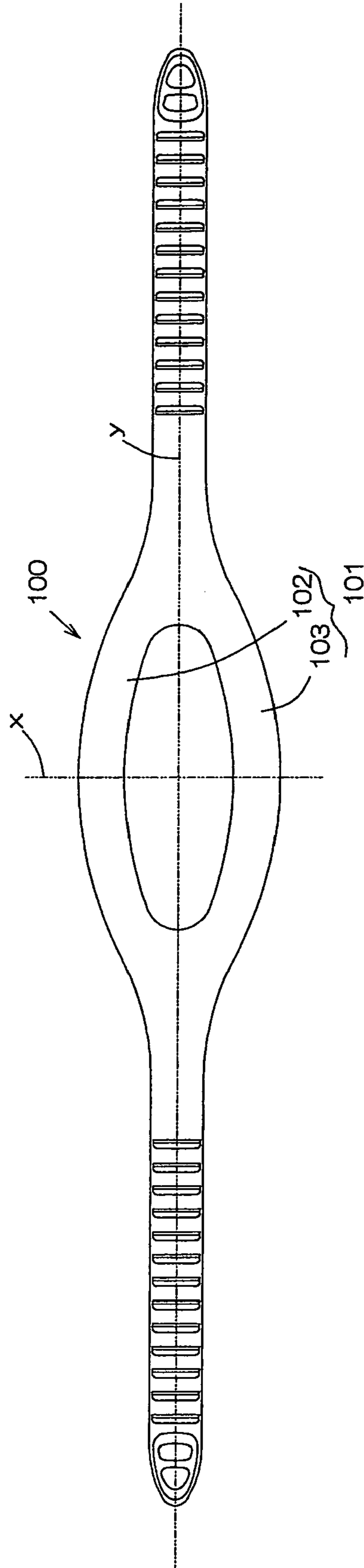


FIG. 8

PRIOR ART



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STRAP FOR DIVING FACE MASK

BACKGROUND OF THE INVENTION

The present invention relates to a strap for diving face mask and more particularly to such a strap having a specific configuration as well as a high functionality in a region thereof adapted to come in contact with the occipital region of the wearer's head.

Conventional diving face masks, for example, one of them as disclosed in Japanese Patent Publication No. 3536004 includes a strap to be put about the wearer's head and such strap is provided in its lengthwise middle zone with a loop section adapted to be held in contact with the occipital region of the wearer's head. The loop section comprises an upper branched sub-section and a lower branched sub-section which are symmetric to each other in a vertical direction as well as in a transverse direction.

Such a conventional strap will be described in more detail with reference to FIG. 8 of the accompanying drawings as showing prior art. The strap 100 includes in its lengthwise middle zone a loop section 101. The loop section 101 comprises an upper branched sub-section 102 and a lower branched sub-section 103 which are symmetric to each other about a first central axis y extending in the transverse direction as well as about a second central axis x extending the vertical direction. In other words, the circumferential length of the upper branched sub-section 102 is exactly the same as the circumferential length of the lower branched sub-section 103. The strap 100 linearly extends along the first central axis y over the entire length. Though not shown, the loop section 101 is two-dimensionally flat as viewed in a sectional view of the strap 100 taken in the vertical direction.

In the case of the conventional strap 100 for diving face mask as has been described above, the upper and lower branched sub-sections 102, 103 constituting together the loop section 101 have exactly the same in the circumferential length and this feature causes a problem as will be described below.

In general, the occipital region of human head (the wearer's head) is three-dimensionally curved so as to have a convexity directed backward and a crowning of such convexity is positioned virtually on the horizontal plane passing the wearer's eyes or slightly above this horizontal plane. Assumed now that the wearer's head is divided into upper and lower sections about the crowning, the circumferential length of the lower section is shorter than the circumferential length of the upper section. With the strap 100 put on the head, the upper branched sub-section 102 is positioned on the upper section of the head and the lower branched sub-section 103 is positioned on the lower section of the head. Consequentially, the lower branched sub-section 103 necessarily becomes slack and/or redundant and a good fit to the lower section of the head is not obtained. To overcome such inconvenience, the wearer usually adjusts the fit, for example, by pulling down the lateral sections of the strap 100. However, such fit adjustment may be inadequately effective or effective temporarily.

SUMMARY OF THE INVENTION

It is an object of the present invention to solve the problem of the conventional strap as has been described above by configuring the loop section of the strap with the respective circumferential lengths of the upper and lower branched sub-sections appropriately matching the circum-

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ferential lengths of the upper and lower sections of the occipital region of the wearer's head and by three-dimensionally configuring the loop section and thereby to provide the strap improved to be put on the wearer's head with a high stability and high fit.

The present invention is directed to a strap for diving face mask having a first lengthwise axis extending lengthwise, a widthwise axis extending widthwise extending widthwise, an inner side facing the wearer's head, an outer side facing away from the wearer's head, a loop section defined in a middle zone thereof as viewed lengthwise and lateral sections extending lengthwise from both sides of the loop section. The loop section comprises an upper branched sub-section and a lower branched sub-section which are divided by a lengthwise axis while the loop section is bilaterally symmetric with respect to the widthwise axis, wherein the upper branched sub-section has a circumferential length larger than a circumferential length of the lower branched sub-section.

To achieve the object set forth above more reliably, the strap include preferably at least one, more preferably two or more of the features as follows: right and left halves of the strap divided by the widthwise axis slope toward the side of the lower branched sub-section; the inner side facing the wearer's head is concavely curved in the loop section as viewed in a sectional view taken widthwise; the upper branched sub-section and the lower branched sub-section are provided with depressed thinner regions; opposite ends of the loop section are provided with depressed thinner regions; and the strap is elastically stretchable at least lengthwise of lengthwise and widthwise.

The strap for diving face mask according to the present invention improves a stability as well as fit with which the strap is put on the wearer's head, particularly on the occipital region of the wearer's head.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view exemplarily showing a strap according to the invention as attached to a diving face mask;

FIG. 2 is a plan view showing the strap as viewed from its outer side facing away from the wearer's head;

FIG. 3 is a side view showing the strap as viewed from one of its side edges;

FIG. 4 is a plan view showing the strap as viewed from its inner side facing the wearer's head;

FIG. 5 is a scale-enlarged sectional view taken along the line V-V in FIG. 2;

FIG. 6 is a scale-enlarged sectional view taken along the line VI-VI in FIG. 2;

FIG. 7 is a diagram illustrating an imaginary position of the strap put on the wearer's head; and

FIG. 8 is a plan view showing a conventional strap.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Details of a strap for diving face mask according to the present invention will be more fully understood from the description given hereunder with reference to the accompanying drawings.

Referring to FIG. 1, a diving face mask 10 comprises a lens frame 11, a lens 12 held by the lens frame 11, a skirt 13 attached to the lens frame 11 and a strap 15 connected to both sides of the lens frame 11 by means of buckles 14.

Referring to FIGS. 1 and 2, the strap 15 is made of a rubber or plastic material which is elastically stretchable

lengthwise (in transverse direction in FIG. 2) as well as widthwise (in vertical direction in FIG. 2) and has a lengthwise axis *y* linearly extending lengthwise in a horizontal state as shown, a widthwise axis *x*, extending widthwise axis *x*, an inner side **16** facing the wearer's head and an outer side **17** facing away from the wearer's head. More specifically, the strap **15** further comprises a substantially elliptical loop section **18** which is relatively long lengthwise and extending in a middle zone of the strap **15** as viewed lengthwise and opposite lateral sections **19** extending lengthwise from both sides of the loop section **18**. The loop section **18** comprises an upper branched sub-section **20** and a lower branched sub-section **21**, which are divided by the lengthwise axis *Y*. The upper branched sub-section **20** has a circumferential length larger than a circumferential length of the lower branched sub-section **21**. Right and left halves **22**, **23** of the strap **15** divided by the widthwise axis *x* slope downward as viewed in FIG. 2, i.e., toward the side of the lower branched sub-section **21** along a second lengthwise axis *y'*. In general, a circumferential length ratio between the upper and lower branched sub-sections **20**, **21** is preferably set to be 80 to 90 for the lower branched sub-section **21** on the assumption of 100 for the upper branched sub-section **20**. The sloping angle, i.e., an angle at which the second lengthwise axis *y'* extends with respect to the first lengthwise axis *y* is preferably in a range of 1 to 15°.

As shown in FIGS. 5 and 6, the inner side **16** facing the wearer's head of the loop section **18** is three-dimensionally curved to have a concave. In other words, the loop section **18** is curved toward the outer side **17** facing away from the wearer's head (See FIG. 3). The upper and lower branched sub-sections **20**, **21** of the loop section **18** are respectively provided on the outer side **17** facing away from the wearer's head with a plurality of depressed thinner regions **24** each extending lengthwise of these branched sub-sections (See FIG. 2). Opposite ends of the loop section **18** from which the upper and lower sub-sections are branched are also provided with depressed thinner regions **25** extending lengthwise and widthwise (See FIG. 2).

As shown in FIGS. 3 and 4, the right and left lateral sections **19** are provided on the inner side **16** facing the wearer's head with a plurality of stopper ridges **26** arranged at regular intervals lengthwise. Each of these stopper ridges **26** selected to adjust the length of the strap comes in engagement with the associated means of the respective buckles **14** (See FIG. 1) and thereby retain the length of the strap adjusted in this manner.

FIG. 7 exemplarily illustrates a position of the strap **15** on the occipital region *b* when the face mask is put on the wearer's head *a*. In this state, the upper branched sub-section **20** is positioned above the crowning *c* of the occipital region *b* convexly curved rearward while the lower branched sub-section **21** is positioned below the crowning *c* of the occipital region *b*. Assumed that the human's head *a* is divided with respect to the crowning *c* into the upper and lower sides, the upper side has a circumferential length larger than a circumferential length of the lower side. Taking account of this, the circumferential length of the lower branched sub-section **21** is dimensioned to be smaller than that of the upper branched sub-section **20**, as has already been described. Such dimensioning effectively eliminates anxiety that, with the face mask put on the wearer's head, the lower branched sub-section **21** might become slack and/or redundant and the strap **15** as a whole might slip down as the conventional strap **100** has been the case. In this way, the fit

of the strap **15** to the wearer's head *a* is improved. Consequently, reliability as well as fit of the face mask **10** is correspondingly improved.

The fit of the strap **15** is further improved by making the right and left halves **22**, **23** of strap **15** divided by the widthwise axis *x* slope toward the side of the lower branched sub-section **21** at an appropriate angle. This is because such slope cooperates with the differential circumference length to equalize the tension exerted on the upper and lower branched sub-sections **20**, **21**. The equalized tension ensures that the wearer might experience a feeling of discomfort due to compression locally exerted on the wearer's head when the strap **15** is put on the wearer's head.

The fit of the strap **15** is further improved also by the inner side **16** facing the wearer's head of the loop section **18** three-dimensionally curved so as to present a concave. This is because the concave of the loop section **18** comes in close contact with the curved surface of the occipital region *b*.

The depressed thinner regions **24**, **25** provided in the loop section **18** improve not only appearance of the strap **15** but also facilitate the upper and lower branched sub-sections **20**, **21** to be elastically stretched. This function also contributes to improvement in the fit of the strap **15**.

While not shown, there is another embodiment providing an effect equivalent to the above-described embodiment in which the upper and lower branched sub-sections **20**, **21** have a differential circumference length.

According to this embodiment, the upper branched sub-section **20** has a circumferential length substantially the same as a circumferential length of the lower branched sub-section **21**. However, appropriate measures are adopted here so that it is easy for the upper branched sub-section **20** to be elastically stretched while it is difficult for the lower branched sub-section **21** to be elastically stretched. For this end, the upper branched sub-section **20** may be formed to be relatively thin while the lower branched sub-section **21** may be formed to be relatively thick or the upper branched sub-section **20** may be made of an elastically stretchable material while the lower branched sub-section **21** may be made of a stretch-resistant material. In this way, it is ensured that the upper branched sub-section **20** has its circumferential length stretched larger than that of the lower branched sub-section **21** as a tension is exerted on the strap **15**.

The present invention is applicable also to the strap for the article other than the herein described face mask adapted to be put on the wearer's face such as swimming goggles, ski goggles or the like.

The entire disclosures of Japanese Patent Application No. 2005-18886 filed on Jan. 26, 2005 including specification, drawings and abstract are herein incorporated by reference in its entirety.

What is claimed is:

1. A strap for diving face mask having a lengthwise axis extending lengthwise, a widthwise axis extending widthwise, an inner side facing a wearer's head, an outer side facing away from the wearer's head, a loop section defined in a middle zone thereof as viewed lengthwise and lateral sections extending from both sides of said loop section lengthwise, wherein said loop section comprises an upper branched sub-section and a lower branched sub-section which are divided by said lengthwise axis while said loop section is bilaterally symmetric with respect to a second lengthwise axis;
 - said upper branched sub-section has a circumferential length larger than a circumferential length of said lower branched sub-section;

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wherein right and left halves of said strap divided by said widthwise axis slope toward the side of said lower branched sub-section.

2. The strap as defined by claim 1, wherein said inner side facing the wearer's head is concavely curved in said loop section as viewed in a sectional view taken widthwise.

3. The strap as defined by claim 1, wherein said upper branched sub-section and said lower branched sub-section are provided with depressed thinner regions.

4. The strap as defined by claim 1, wherein opposite ends of said loop section lengthwise are provided with depressed thinner regions.

5. The strap as defined by claim 1, wherein said strap is elastically stretchable at least lengthwise of lengthwise and widthwise.

6. A strap for diving face mask having a lengthwise axis extending lengthwise, a widthwise axis extending widthwise, an inner side facing a wearer's head, an outer side facing away from the wearer's head, a loop section defined in a middle zone thereof as viewed lengthwise and lateral sections extending from both sides of said loop section lengthwise, wherein said loop section comprises an upper branched sub-section and a lower branched sub-section which are divided by said lengthwise axis while said loop section is bilaterally symmetric with respect to a second lengthwise axis;

said upper branched sub-section has a circumferential length larger than a circumferential length of said lower branched sub-section;

wherein said inner side facing the wearer's head is concavely curved in said loop section as viewed in a sectional view taken widthwise.

7. The strap as defined by claim 6, wherein said upper branched sub-section and said lower branched sub-section are provided with depressed thinner regions.

8. The strap as defined by claim 6, wherein opposite ends of said loop section lengthwise are provided with depressed thinner regions.

9. The strap as defined by claim 6, wherein said strap is elastically stretchable at least lengthwise of lengthwise and widthwise.

10. A strap for diving face mask having a lengthwise axis extending lengthwise, a widthwise axis extending width-

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wise, an inner side facing a wearer's head, an outer side facing away from the wearer's head, a loop section defined in a middle zone thereof as viewed lengthwise and lateral sections extending from both sides of said loop section lengthwise, wherein said loop section comprises an upper branched sub-section and a lower branched sub-section which are divided by said lengthwise axis while said loop section is bilaterally symmetric with respect to a second lengthwise axis;

said upper branched sub-section has a circumferential length larger than a circumferential length of said lower branched sub-section;

wherein said upper branched sub-section and said lower branched sub-section are provided with depressed thinner regions.

11. The strap as defined by claim 10, wherein opposite ends of said loop section lengthwise are provided with depressed thinner regions.

12. The strap as defined by claim 10, wherein said strap is elastically stretchable at least lengthwise of lengthwise and widthwise.

13. A strap for diving face mask having a lengthwise axis extending lengthwise, a widthwise axis extending widthwise, an inner side facing a wearer's head, an outer side facing away from the wearer's head, a loop section defined in a middle zone thereof as viewed lengthwise and lateral sections extending from both sides of said loop section lengthwise, wherein said loop section comprises an upper branched sub-section and a lower branched sub-section which are divided by said lengthwise axis while said loop section is bilaterally symmetric with respect to a second lengthwise axis;

said upper branched sub-section has a circumferential length larger than a circumferential length of said lower branched sub-section;

wherein opposite ends of said loop section lengthwise are provided with depressed thinner regions.

14. The strap as defined by claim 13, wherein said strap is elastically stretchable at least lengthwise of lengthwise and widthwise.

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